CLAIMS

1. The use of a phosphorus containing ligand as a ligand for a metathesis catalyst in a catalysed metathesis reaction wherein the phosphorus containing ligand is a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the heterocyclic ring structure of the heterocyclic organic compound.

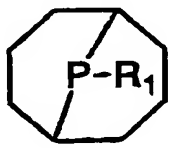
2. The use of a phosphorus containing ligand in the preparation of a catalyst containing the ligand, which catalyst is for use in a metathesis reaction, wherein the phosphorus containing ligand is a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the heterocyclic ring structure of the heterocyclic organic compound.

3. The use of either one of claims 1 or 2 wherein the metathesis reaction is a homogenous metathesis reaction.

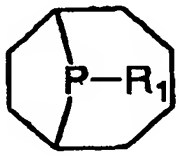
4. The use of any one of the preceding claims wherein the phosphorus containing ligand comprises a phosphine ligand.

5. The use of claim 4 wherein the ligating phosphorus atom is also bound to a further moiety which is an organyl and which is not part of the heterocyclic ring structure.

6. The use of any one of claims 1 to 4 wherein the phosphorus containing ligand is a 9-phosphabicyclo[3.3.1]nonane of formula 2a or a 9-phosphabicyclo[4.2.1] nonane of formula 2b or mixtures thereof:



..... (2a)



..... (2b)

wherein R_1 is H or an organyl.

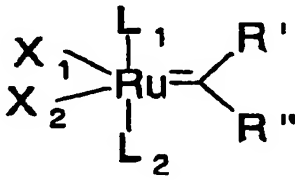
7. The use of claim 6 wherein R_1 is $-C_{20}H_{41}$.

8. The use of claim 6 wherein R_1 is cyclohexyl.

9. The use of any one of the preceding claims wherein the metathesis reaction is a reaction selected form the group consisting of cross metathesis, ring-opening metathesis polymerisation and ring-closing metathesis.

10. A metathesis catalyst which includes a phosphorus containing ligand which is a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the heterocyclic ring structure of the heterocyclic organic compound.

11. A compound of formula 3:



.....(3)

wherein

L_1 is a neutral electron donor ligand;

L_2 is a phosphorous containing ligand in the form of a heterocyclic organic compound in the form of a phosphabicycloalkane with a ligating phosphorus atom as an atom in the heterocyclic ring structure of the heterocyclic organic compound;

X_1 and X_2 are independently selected from an anionic ligand; and

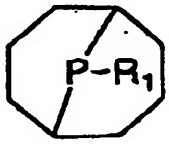
R' and R" are independently selected from H and an organyl.

12. The compound of claim 11 which is a homogeneous metathesis catalyst.

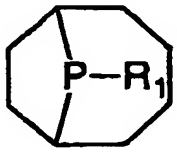
13. The compound of either one of claims 11 or 12 wherein L_1 is the same as L_2.

14. The compound of any one of claims 11 to 13 wherein the phosphorus containing ligand of L_2 comprises a phosphine ligand.

15. The compound of claim 14 wherein L_2 is a 9-phosphabicyclo[3.3.1]nonane, of formula 2a, or a 9-phosphabicyclo[4.2.1] nonane of formula 2b or mixtures thereof:



..... (2a)



..... (2b)

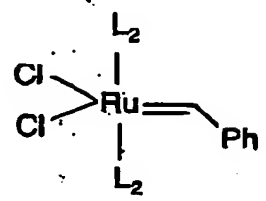
wherein R_1 is H or an organyl.

16. The compound of claim 15 wherein R_1 is $-C_{20}H_{41}$.

17. The compound of claim 15 wherein R_1 is cyclohexyl.

18. The compound of any one of claims 11 to 17 wherein X_1 and X_2 are each independently selected from halide.

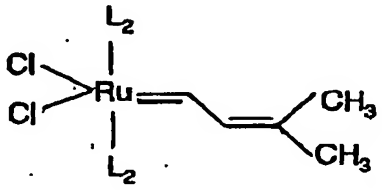
19. The compound of claim 11 which is a compound of formula 7:



..... (7)

wherein L_2 is the same or different and is as defined in claim 11.

20. The compound of claim 11 which is a compound of formula 8



..... (8)

wherein L_2 is the same or different and is as defined in claim 11.

21. The compound of either one of claims 19 or 20 wherein L_2 is as defined in claim 15.

22. The use of a compound of any one of claims 11 to 20 in a metathesis reaction.

23. The use of claim 22 wherein the metathesis reaction is a homogeneous metathesis reaction selected from the group consisting of cross metathesis ring-opening metathesis polymerisation and ring-closing metathesis.

24. A catalysed metathesis reaction wherein at least one olefinic compound is subjected to metathesis in the presence of a compound of claim 11.

25. The reaction of claim 24 wherein the compound of claim 11 is formed *in situ*.

26. A metathesis product formed by the reaction of either one of claims 24 or 25.